Exhibit I-e

FOUNDATION ENGINEERING STUDY

For

Proposed O'Reilly Auto Parts Store

489 West 5th Avenue
Junction City, Oregon

Prepared for:

O'Reilly Auto Parts

233 South Patterson
Springfield, Missouri 65802

Prepared by:
ATC Associates Inc.
1555 Valwood Parkway, Suite 160
Carrollton, Texas 75006

ATC Project No. 90.75356.0084

July 17, 2012

Exhibit

ATC ASSOCIATES INC.

Environmental, Geotechnical and Materials Professionals

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July 17, 2012

Mr. Curtis McNay
O'Reilly Auto Parts
233 South Patterson
Springfield, Missouri 65802

Re: FOUNDATION ENGINEERING STUDY
Proposed O'Reilly Auto Parts Store
489 West 5th Avenue
Junction City, Oregon
ATC Project No. 90.75356.0084

Dear Mr. McNay,

ATC Associates Inc. (ATC) is pleased to present this Foundation Engineering Study for a proposed O'Reilly Auto Parts store site located at 489 West 5th Avenue, Junction City, Oregon.

The attached report describes our exploration procedures, summarizes existing site and subsurface conditions, and presents our geotechnical findings and recommendations.

ATC appreciates this opportunity to provide these services and look forwards to working with O'Reilly Auto Parts on future projects. Please contact us if you have any questions or require additional information.

Sincerely,

ATC ASSOCIATES INC.

REGISTERED PROFESSIONAL ENGINEER
17,103
OREGON
MARCH 15, 1994
DEAN M. WHITE
EXP 6/30/14

Tyrone M. Clinton, DBA
Senior Project Manager

Dean M. White, PE, GE
Senior Engineering Consultant

Dale M. Allison
Director, National Client Management

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FOUNDATION ENGINEERING STUDY
PROPOSED O'REILLY AUTO PARTS STORE
489 WEST 5TH AVENUE
JUNCTION CITY, OREGON

INTRODUCTION

Project Description

O'Reilly Auto Parts (hereafter referred to as client) retained ATC Associates Inc. (ATC) to provide geotechnical services for the development of foundation, pavement and site preparation recommendations at a proposed O'Reilly Auto Parts store site located in Junction City, Oregon.

The site is located on the west side of Highway 99W between 4th and 5th Avenues in Junction City, Oregon as shown on Figure 1 included in the Appendix. The site has a relatively flat topography and ground cover generally consists of asphaltic concrete paving. The general arrangement of the proposed development on the site is shown on the Site/Test Pit Location Plan (Figure 2) included in the Appendix.

It is anticipated that the proposed store will be a single-story structure of masonry construction with a slab on grade floor and no basement. Plan area of the new store is approximately 7,000 sf. According to O'Reilly Work Order No. JCT, the maximum anticipated structural loads are 125 psf for floor, 1 kip/lineal foot for walls and 30 kips for columns. Site grading information was not provided; however, we anticipate cuts and fills of approximately 1 to 3 feet.

Portland Cement Concrete (PCC) pavement is also planned for the parking and drive areas; however, alternative recommendations for asphaltic concrete (AC) pavement are included herein. It is anticipated that traffic in the proposed pavement areas will consist primarily of automobile and light truck traffic with an occasional semi-tractor trailer.

If the details of the proposed construction differ from that described herein, ATC should be contacted to evaluate the potential impact on the recommendations provided in this report.

Exploration for underlying geologic conditions or evaluation of potential geologic hazards, such as mining, landslides, seismic activity, faulting and/or ground subsidence/cracking potential due to groundwater withdrawal, were beyond the scope of this study. Potential for liquefaction is addressed in the Building Pad Preparation Recommendations section.

Purpose and Scope

The purpose of this study has been to develop foundation design and subgrade modification recommendations for the project. The scope of services presented in this report has been based upon the information provided by O'Reilly Auto Parts. To accomplish its intended purpose, the study has been conducted in the following phases:

1. Excavate soil test pits to determine the general subsurface conditions and to obtain samples for testing;
2. Performing laboratory tests on appropriate samples to determine pertinent engineering properties of the subsurface materials; and,
3. Performing engineering analyses, using the field and laboratory data to develop foundation design and subgrade modification recommendations for the proposed development.

FIELD EXPLORATION AND TESTING

Field Exploration

The field exploration was conducted at the site on July 12, 2012. ATC retained the services of an independent contractor to excavate the test pits and collect soil samples for testing. Soil conditions beneath the site were explored for this study by excavating 6 test pits to depths between approximately 4 and 15 feet. The location and depth of the test pits were specified by the client. Test pits were located in the field by reference from existing features and by using conventional measuring methods. The accuracy of the test pit locations should only be considered to the level implied by the method used to determine them. Approximate test pit locations are shown on the Site/Test Pit Location Plan (Figure 2) included in the Appendix.

The enclosed Test Pit Logs indicate the vertical sequence of soils and materials encountered in each test pit, based on our field classifications. The test pits were logged and representative grab samples of the subsurface materials were obtained by a senior geotechnical engineer. Where a soil contact was observed to be gradational or undulating, our logs indicate the average contact depth. We estimated the relative density and consistency of the in-situ soils by means of the excavation characteristics and the stability of the test pit sidewalls. Our logs also indicate the approximate depths of any sidewall caving or groundwater seepage observed in the test pits and the depths at which samples were collected. Samples will be retained for 30 days from the date of this report, after which time they will be discarded unless client requests otherwise.

Groundwater conditions recorded on the Test Pit Logs are based on the field observations at the time the exploration was conducted. Upon completion of the excavating operations, test pits were backfilled with the materials excavated from the hole.

Laboratory Testing

Soil samples were transported to the laboratory where the Field Test Pit Logs were reviewed and edited by an engineering geologist and geotechnical engineer. Soil samples were then selected for geotechnical laboratory testing. Testing included Atterberg Limits, sieve analyses and moisture content tests. All laboratory testing was conducted in general accordance with the applicable ASTM Standards. The results of the laboratory tests are provided on the appropriate Test Pit Logs, which are included in the Appendix. Soil descriptions recorded on the Test Pit Logs result from field data as well as laboratory test data.

SUBSURFACE CONDITIONS

Subsurface Conditions

Generally, subsurface materials within the maximum depth explored (15 feet) consist of compacted fill, medium stiff clay and silt and gravel with traces of silt and clay, in sequence starting from the surface. It appears that the original grade of the site was two to three feet below the current grade and that quarry spalls and/or shot rock was forced into the subgrade to allow further soils to be placed upon the clay soils formerly at the surface. When this fill operation was complete, base course and asphaltic concrete were placed. The asphaltic concrete paving is in good structural condition for its age, which was estimated at over twenty years, exhibiting no signs of underlying subgrade failure.

Site Class – Part of the International Building Code (IBC) procedure to evaluate seismic forces requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface. To define the Seismic Site Class for this project, we have interpreted the results of our test pit excavations within the project site and estimated appropriate soil properties below the base of the test pits to a depth of 100 feet, as permitted by Section 1613.5.2.

Based upon our evaluation, it is our opinion that the subsurface conditions within the site are consistent with the characteristics of Site Class D as defined in Table 1613.5.2 of the IBC.

Groundwater Observations

During and upon completion of the drilling operations, groundwater was observed in several (but not all) of the test pits at depths of between 9 and 11 feet below the surface. Based on our discussions with the excavation subcontractor, we understand that groundwater in the area typically fluctuates at depths between 10 and 20 feet below the surface. The presence, depth and quantity of groundwater seepage may fluctuate based on variations in seasonal rainfall, climatic conditions, site surface runoff characteristics, permeability of on-site soils, continuity of pervious materials, irrigation practices, and other factors. These observations do not constitute a long-term groundwater study nor was such an evaluation authorized as a part of the scope of this study. Any changes noted in groundwater levels during the construction process may require a review of the recommendations presented in this report.

ANALYSIS AND RECOMMENDATIONS

Project Information

The site is located at 489 West 5th Avenue in Junction City, Oregon. It is anticipated that the proposed store will be a single-story structure of metal construction with a concrete slab on grade floor and no basement. Plan area of the new store is approximately 7,000 sf. Portions of the site will be paved for parking and vehicle traffic. Based on information provided in the O'Reilly Work Order No. JCT, the maximum anticipated structural loads are 125 psf for floor, 1 kip/lineal foot for walls and 30 kips for columns. Site grading information was not provided; however, we anticipate cuts and fills of approximately 1 to 3 feet. The general arrangement of the proposed development is shown on the Site/Test Pit Location Plan (Figure 2) included in the Appendix.

ATC has developed foundation design recommendations on the basis of the previously described project characteristics and subsurface conditions observed in the test pits performed during the field exploration. After final design plans and specifications are available, a general review by ATC is recommended as a means to check that the evaluations made in preparation of this report are correct, and that earthwork, foundation and subgrade preparation recommendations are properly interpreted and implemented.

Site Preparation

Before proceeding with construction, any old building foundations, buried structures, uncontrolled fill, construction debris, vegetation, root systems, topsoil, road materials, refuse, sediment in low-lying areas, and other deleterious non-soil materials should be stripped, as needed, from proposed construction areas. The actual stripping depth should be based on field observations with particular attention given to old drainage areas, uneven topography, unexpected fill material areas, and excessively wet soils (if present). The stripped areas should be observed to determine if additional excavation is required to remove weak or otherwise objectionable materials that would adversely affect the fill placement. The stripping should extend at least 5 feet beyond the limits of construction areas.

After site stripping, the subgrade shall be proofrolled to detect soft spots or unstable areas. Proofrolling shall be performed using a heavy pneumatic tired roller, loaded dump truck, or similar piece of equipment weighing approximately 25 tons. The proofrolling operations shall be observed by a geotechnical engineer or his representative. The subgrade shall be firm and able to support the construction equipment without displacement. Soft or yielding subgrade shall be corrected and made stable before construction proceeds. The depth and extent of the undercut operations at the site should be established by a qualified geotechnical engineer during earthwork construction activities. Proofrolling is intended not only for the building and foundation areas, but also within all areas of pavement, sidewalks, and other locations that will support surface loads.

Prior to fill placement and/or construction of the foundation, floor slab, pavement and other flatwork, the subgrade should be scarified to a minimum depth of 12 inches, its moisture content adjusted, and the subgrade then compacted to at least 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density within plus or minus 2 percentage points of optimum moisture content (-2 to +2).

Generally, more undercutting and delays due to the need for extended drying times can be expected if the grading is performed in the seasonally wet periods of the year.

Placement and Compaction

The project may include the placement and compaction of a variety of fill materials, including on-site materials, non-expansive select fill, and base materials. Typical material requirements and compaction specifications for each of these materials are provided below.

> **On-Site Soils -** On-site clayey or silty soils used in areas subject to surface loads or used as backfill or engineered fill should be compacted to at least 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density within plus or minus 2 percentage points of optimum moisture content (-2 to +2). It may be difficult to achieve these requirements during the wet season.
>
> **Backfill or Engineered Fill –** Imported non-expansive backfill or engineered fill placed beneath the foundation, floor slab, sidewalks, pavement and other exterior flatwork should consist of a select, well-graded granular material no particles greater than 3 inches and contain no more than 5 percent passing the No. 200 US Standard Sieve. Organic content should be less than 4 percent. The select fill should contain no deleterious material and should be compacted to 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density within plus or minus 2 percentage points of optimum moisture content (-2 to +2).
>
> **Crushed Aggregate Surfacing -** Aggregate base course placed beneath pavements should meet the requirements for crushed base aggregate in Section 02630 of the 2010 ODOT Standard Specifications for Highway Construction herein after referred to as ODOT *Standard Specifications*. In addition, the base course material should be moisture stable. Aggregate base course should be compacted to a minimum of 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density.

The moisture content must be maintained until placement of the first fill lift. Fill material, whether non-expansive select fill, crushed aggregate surfacing or moisture-conditioned on-site soils, should be placed in loose lifts not exceeding 8 inches in uncompacted thickness. The fill material should be uniform with respect to material type and moisture content. Clods and chunks of material should be broken and the fill material mixed as necessary, so that a material of uniform moisture and density is obtained for each lift. Water required to bring the fill material to the proper moisture content should be applied evenly through each layer.

Each lift should be compacted, tested, and approved before another lift is added. As a guide, one field density test per lift for each 5,000 square feet of compacted area is recommended. For small areas or critical areas the frequency of testing may need to be increased to one test per 2,500 square feet. A minimum of two tests per lift should be required. The purpose of the field density tests is to provide some indication that uniform and adequate compaction is being obtained. The actual quality of the fill, as compacted, should be the responsibility of the contractor and satisfactory results from the tests should not be considered as a guarantee of the quality of the contractor's work.

Backfill placed within utility trenches that cross building, pavement and other flatwork areas should be properly compacted. Settlement of parking, drive, sidewalk, and landscape areas due to improper compaction of the backfill within utility trenches is a common problem. Therefore, backfill placed in utility trenches or other excavated areas within the building, pavement and other flatwork areas should be placed in lifts, compacted, and tested in accordance with these earthwork recommendations. Trenches should be opened a sufficient width to safely allow compaction equipment access to the backfill and to safely allow for confirmation testing to occur. Backfill should be placed in horizontal lifts. If the trench is over 5 feet deep, the side slopes should be benched or sloped to meet OSHA requirements prior to placing the backfill.

Site Excavation Characteristics

Finished grades at the site were not provided to us at the time of this report. However, we do not anticipate that excavations that exceed the depth of our test pits will be required to develop the site. “Rock” was not encountered in the test pits performed during this exploration. Therefore, rock excavation is not anticipated.

We present the following general comments regarding our opinion of the excavation conditions for the designers’ information with the understanding that they are opinions based on information from test pits. More accurate information regarding the excavation conditions should be evaluated by contractors or other interested parties from test excavations using the equipment that will be used during construction. Based on our subsurface evaluation it appears that shallow excavations in soils at the site will be possible using standard excavation equipment.

During and upon completion of site exploration, groundwater was observed in the test pits at approximately 10 feet below the surface. Depending on the depth and type of excavations necessary to complete site development, groundwater may be encountered in deeper excavations. The presence and magnitude of groundwater seepage may fluctuate based on variations in seasonal rainfall, climatic conditions, site surface runoff characteristics, permeability of on-site soils, continuity of pervious materials, irrigation practices, and other factors.

Groundwater traveling through the soil is often unpredictable. This could be due to seasonal changes in groundwater and due to the unpredictable nature of groundwater paths. Therefore, it is necessary during construction for the contractor to be observant for groundwater seepage in excavations in order to assess the situation and make necessary changes and/or recommendations.

In accordance with OSHA requirements, the design and maintenance of all excavation retention systems is the sole responsibility of the Contractor. Attention is drawn to OSHA Standards 29 CFR - 1926 Subpart P for guidance in the design of such systems.

Building Pad Preparation Recommendations

The building pad area should be prepared as previously recommended in the **Site Preparation** section. Prior to fill placement and/or construction of the foundation and floor slab, the subgrade should be scarified to a minimum depth of 12 inches, its moisture content adjusted, and the subgrade then compacted to at least 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density within plus or minus 2 percentage points of optimum moisture content (-2 to +2).

Liquefaction – Soil liquefaction is the loss of soil strength during a significant seismic event. It occurs primarily in loose, fine to medium grained, granular soils lying below groundwater. Liquefaction occurs during rearrangement of soil particles into a denser condition, resulting in localized areas of settlement. Based on field tests performed in the test pits, groundwater observations, visual observations of soil samples and laboratory test results, it is our opinion that the potential for liquefaction of the underlying clay or silt soils is unlikely. Recommendations follow for a shallow footing foundation system.

Footings

The structural frame and walls of the proposed store can be supported on a conventional shallow footing foundation system. Footings, bearing on natural soils a minimum of 1.5 feet below grade (ground/pavement surface existing at the time of our field exploration), can be proportioned on the basis of a net allowable soil bearing pressure of 1,500 psf (dead + live loads). The aforementioned bearing value is based on a Factor of Safety of 3 and can be increased by 1/3 for effects of seismic or wind forces. In using the above net pressure, the weight of the footing and backfill over the footing, including the weight of the floor slab, need not be considered. Hence, only loads applied at/or above the finished floor need to be used in dimensioning footings.

For frost protection, the exterior grade should be a minimum of 18 inches above bottoms of the exterior footings or as required by local building code. Spread footings should have a minimum plan dimension of 24 inches and strip (continuous) footings should have a minimum width of 18 inches for bearing capacity considerations. Footings should be founded at least 18 inches below lowest adjacent grade.

It is important that all footings be located so that the least lateral distance between any 2 footings will be at least equal to or greater than the difference in their bearing elevations. This will reduce the pressure overlap of adjacent footings.

Lateral Resistance – Lateral loads against building footings may be resisted by friction between bottoms of footings and laterally supporting soils. An allowable frictional coefficient of 0.35 is recommended. Alternately, provided footings are cast neat against compacted soils, an allowable lateral bearing pressure of 240 pounds per square foot per foot of depth can be used with a maximum lateral bearing pressure of 1,800 pounds per square foot. A combination of friction and lateral bearing pressure can be used provided the latter is reduced 1/3.

Foundation excavations shall be properly observed by the geotechnical engineer or his representative to confirm that loose, soft, frozen or otherwise undesirable materials are removed so that foundations will bear on sound material. Soils exposed in the bases of all satisfactory foundation excavations shall be protected against detrimental changes in conditions such as disturbance, rain, excessive drying or freezing. Surface runoff shall be directed away from the excavations and not allowed to pond within or near formed foundation excavations. If possible, all concrete for foundations should be placed the same day the excavation is made.

If weak, loose or soft pockets are encountered in footing excavations and it is inconvenient to lower them, the proposed footing elevations may be re-established by backfilling after the undesirable material has been removed. Backfilling may be done with a lean concrete or a select material as described in **Placement and Compaction** section. Soil backfill should be compacted to at least 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density. Such soil backfill should extend outward and downward on a 1 to 2 (horizontal to vertical) slope from the base perimeter of the footing.

Floor System

The floor system (combined with a conventional shallow footing foundation) for the proposed store can consist of a concrete slab designed to bear uniformly on a granular base material placed on the properly compacted subgrade or engineered fill **of uniform thickness**. We recommend installation of a 6-inch layer of compacted granular material such as sand, sand and gravel or crushed stone (no more than 5 percent fines passing the No. 200 US Standard Sieve) beneath the floor slab area to improve subgrade support and reduce potential subgrade deterioration due to construction traffic and weather.

If a capillary moisture barrier is desired, the blanket should consist of a free-draining granular material meeting the following gradation, as determined by ASTM D 422:

Sieve Size	Percent Passing
1 inch	100
#4	0

In moisture sensitive areas, a vapor barrier consisting of 10 mil polyethylene sheeting should be placed directly above the granular blanket. A 2-in thick layer of damp, clean sand should be placed on the vapor barrier to promote uniform curing of slab concrete and as a vapor barrier puncture protection during construction process. The sand layer should be moistened with water just prior to concrete placement.

If the slab on grade floor system is rigidly connected to the foundation rather than allowed to “float”, it may be necessary to increase its thickness. Adequate reinforcement should be provided to reduce possible cracking that can occur in the slab and walls resulting from foundation and slab movements. **The structural engineer should evaluate configurations and reinforcement requirements for structural loadings, anticipated foundation movements, shrinkage and temperature stresses.**

Foundation and Floor Slab Settlements

Provided the footings and floor slab bear on materials approved by the geotechnical engineer, and placement, compaction and composition of engineered fill and select fill are as outlined herein, it is estimated that total settlements should be limited and not exceed approximately 1 inch. Differential settlements should not exceed 75 percent of the estimated total settlement.

Site Drainage and Landscaping

Adequate drainage should be provided at the site to minimize any increase in moisture content of the underlying soils. Adjacent pavement, sidewalks and other exterior flatwork should be sloped a minimum of 1% (2% for ground surface surrounding the structure) to prevent ponding of water around the building. Downspouts should be connected to gravity drains or discharge onto splash blocks to prevent erosion adjacent to the structure. Also, good drainage should be provided in paved areas since the at- and near-surface soils are susceptible to pumping if they become saturated (wet). Pumping will contribute significantly to pavement failure. Drainage patterns approved at the time of finish grading should be maintained throughout the life of the building. It should be understood that altered drainage patterns, landscaping, planters and other improvements, as well as irrigation and variations in seasonal rainfall, all affect subsurface moisture conditions, which in turn could affect pavement and structural performance.

It is recommended that all joints in pavements and where pavements, sidewalks, other exterior flatwork, etc. butt against building foundation and/or curbs, be sealed. Sealing joints will help minimize the infiltration of surface water into the underlying subgrade materials. In general, the sealant used should remain plastic and flexible at normal service temperatures. Maintenance should include periodic inspection for open joints and cracks and resealing as necessary.

Winter Construction

If construction of the project is accomplished during winter, steps should be taken to prevent the soils under the footings or floor slab from freezing. IN NO CASE should the footings, floor slab, pavement or other exterior flatwork be placed on frozen or partially frozen materials. Frozen materials should be removed and replaced with approved on-site soils or imported select fill material as described the **Placement and Compaction** section.

PAVEMENT

Design Considerations

Traffic loading information for the proposed pavement was not available at the time of this report submittal. It is anticipated that the parking stalls will be subject to automobile traffic only (light duty pavement section) and that drives will be subject to both automobile and occasional medium to heavy truck traffic (medium duty pavement section. It is expected that the pavement will consist of Portland Cement Concrete. If the anticipated traffic loading conditions are different than indicated herein ATC should be contacted since it could impact the recommendations presented in the following sections.

Pavement Subgrade Preparation

The pavement area should be prepared as previously recommended in the **Site Preparation** section. Prior to fill placement and/or construction of the pavements, the subgrade should be scarified to a minimum depth of 12 inches, its moisture content adjusted, and the subgrade then compacted to at least 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density within plus or minus 2 percentage points of optimum moisture content (-2 to +2). Compaction of the subgrade should extend a minimum of 2 feet beyond the outer edges of pavement or curbs.

Portland Cement Concrete Pavement (PCCP)

If PCCP pavements are utilized, the following recommendations are made expecting that the pavement subgrade soils will consist primarily of on-site gravelly and sandy soils. Typical pavement sections for PCCP are presented in the following Table 1.

Table 1 - PCCP Sections

Pavement Type	Pavement Section		
	Parking Areas	Main Drive Lanes	Fire Lanes and Dumpster Pad/Approach
Portland Cement Concrete	5 inches	6 inches	7 inches
Compacted Subgrade	12 inches	12 inches	12 inches

Concrete should have a minimum flexural strength of 600 psi at 28 days; that corresponds to roughly 3,600-psi compressive strength. Concrete should be steel reinforced and include joints to control the formation of temperature and shrinkage related cracks. Concrete should include air entrainment to increase the resistance to temperature effects and improve workability. As a general guide, the air entrainment should vary from 5 to 7 percent (by volume). A granular subbase consisting of a clean sand layer placed between the pavement and the properly compacted subgrade is optional. If a sand subbase is used, it should be moistened with water immediately prior to concrete placement.

Utility trench backfill that lies within paved and other flatwork areas must be properly compacted. Fill or backfill areas should be proofrolled to verify that soft or yielding subgrade areas have been properly compacted (refer to the **Site Preparation** section for detailed proofrolling recommendations).

It is important to minimize moisture changes in the pavement subgrade. The pavement and adjacent areas should be well drained. Regular maintenance should be performed on cracks in the pavement surface to prevent water passing through to the subgrade.

Hot Mix Asphalt Pavement (HMAP)

Typically, a rigid pavement section is recommended for long term performance and should be used in Fire Lanes and Dumpster Pad areas. However, ATC understands that a flexible section may be considered for the majority of the paved areas at the site. Typical flexible pavement sections for similar applications are provided in the following Table 2:

Table 2 - HMAP Sections

Traffic	Flexible Section
Standard Duty[1]	3" HMA Class ½-inch 6" Crushed Aggregate Surfacing Base - ODOT 02630
Medium Duty[2]	3" HMA Class ½-inch 8" Crushed Aggregate Surfacing Base - ODOT 02630
Compacted Subgrade	12 Inches

1. **Standard Duty -** Parking and light traffic
2. **Medium Duty -** Drive lanes

Crushed aggregate surfacing base course placed beneath pavements should meet the requirements in Section 02630 of the ODOT *Standard Specifications*. In addition, the base course material should be moisture stable. Aggregate base course should be compacted to a minimum of 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density. The performance of the recommended pavement sections can be enhanced by minimizing excess moisture that can reach the subgrade soils. The following recommendations should be considered at minimum:

- Site grading at a minimum 2 percent grade away from the pavements;
- Compaction of any utility trenches to the same criteria as the pavement subgrade.

Preventive maintenance should be planned and provided for through an on-going pavement management program to enhance future pavement performance. Preventive maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment.

All asphaltic concrete mixes and aggregate base materials used in construction of pavement should be approved by the geotechnical engineer and meet the ODOT *Standard Specifications*. The placement of asphaltic concrete should be in accordance the ODOT *Standard Specifications* or as directed by the geotechnical engineer.

Pavement Considerations

Pavement design methods are intended to provide an adequate thickness of structural materials over a particular subgrade, such that wheel loads are distributed to a level, which the subgrade can support. It is important to minimize moisture changes in the subgrade. All pavements shall be sloped to provide rapid surface drainage. Water should not be allowed to pond on or adjacent to the pavement.

The pavement design recommendations are subject to successful completion of site and subgrade preparation and structural fill placement as recommended in this report. Imported soils used in paved areas should meet the criteria for engineered (select) fill outlined in the **Placement and Compaction** section.

The compaction, quality, and gradation of the crushed aggregate surfacing base course will directly affect the quality and life of the pavement section. Consequently, we recommend a minimum compaction of 95 percent of modified Proctor (ASTM D 1557) maximum laboratory dry density. This will improve the support for the edge of the pavement.

Since paving and site grading are typically performed by separate contractors, a time lapse generally occurs between the end of site grading operations and the commencement of paving. Disturbance, desiccation, and/or wetting of the subgrade prior to completion of paving can result in deterioration of the previously compacted subgrade. A non-uniform subgrade can result in poor pavement performance and local failures relatively soon after pavements are constructed. Where applicable, we recommend the pavement subgrade be proofrolled and the moisture content and density of the top 12 inches of subgrade be checked within two days prior to commencement of actual paving operations. If any significant event, such as precipitation, occurs after proofrolling, the subgrade shall be reviewed by qualified personnel immediately prior to placing the pavement. The subgrade shall be in its finished form at the time of the final review.

A soil engineering technician working under the direction of a geotechnical engineer should observe compaction of the subgrade and perform soil density tests to confirm that the subgrade has been properly compacted in accordance with the recommendations presented herein. In addition, all paving materials and paving operations should meet applicable specifications of the local governing agency.

All joints including sawed joints should be properly cleaned and sealed as soon as possible to avoid infiltration of water, small gravel, etc. Either cold-poured or hot-poured sealing material may be used. Backing should be provided to hold the isolation joint sealant in place. Manufacturers' instructions for mixing and installing the joint materials should be followed.

It is recommended that the concrete pavement be reinforced with No. 3 or larger bars supported on appropriate chairs and placed on a minimum of approximately 24-inch centers in each direction.

The perimeter of the pavement should have a stiffening curb section to reduce the potential for distress due to heavy wheel loads near the edge of the pavements and to provide channelized drainage.

Periodic maintenance of all of the pavements should be anticipated. This should include sealing of all cracks and joints and by maintaining proper surface drainage to avoid ponding of water on or near the pavement areas. Even with these precautions, some movements and related cracking may still occur, requiring additional maintenance.

BASIS FOR RECOMMENDATIONS

ATC's professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. ATC is not responsible for the conclusions, opinions, or recommendations made by others based upon this data.

The scope of our services was intended to evaluate soil conditions within the primary influence of the proposed structure and does not include an evaluation of potential deep soil conditions. Analyses and recommendations submitted in this report are based upon the data obtained from the soil test pits performed at the locations indicated. Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions between test pits will be different from those at specific test pit locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process itself may alter soil conditions.

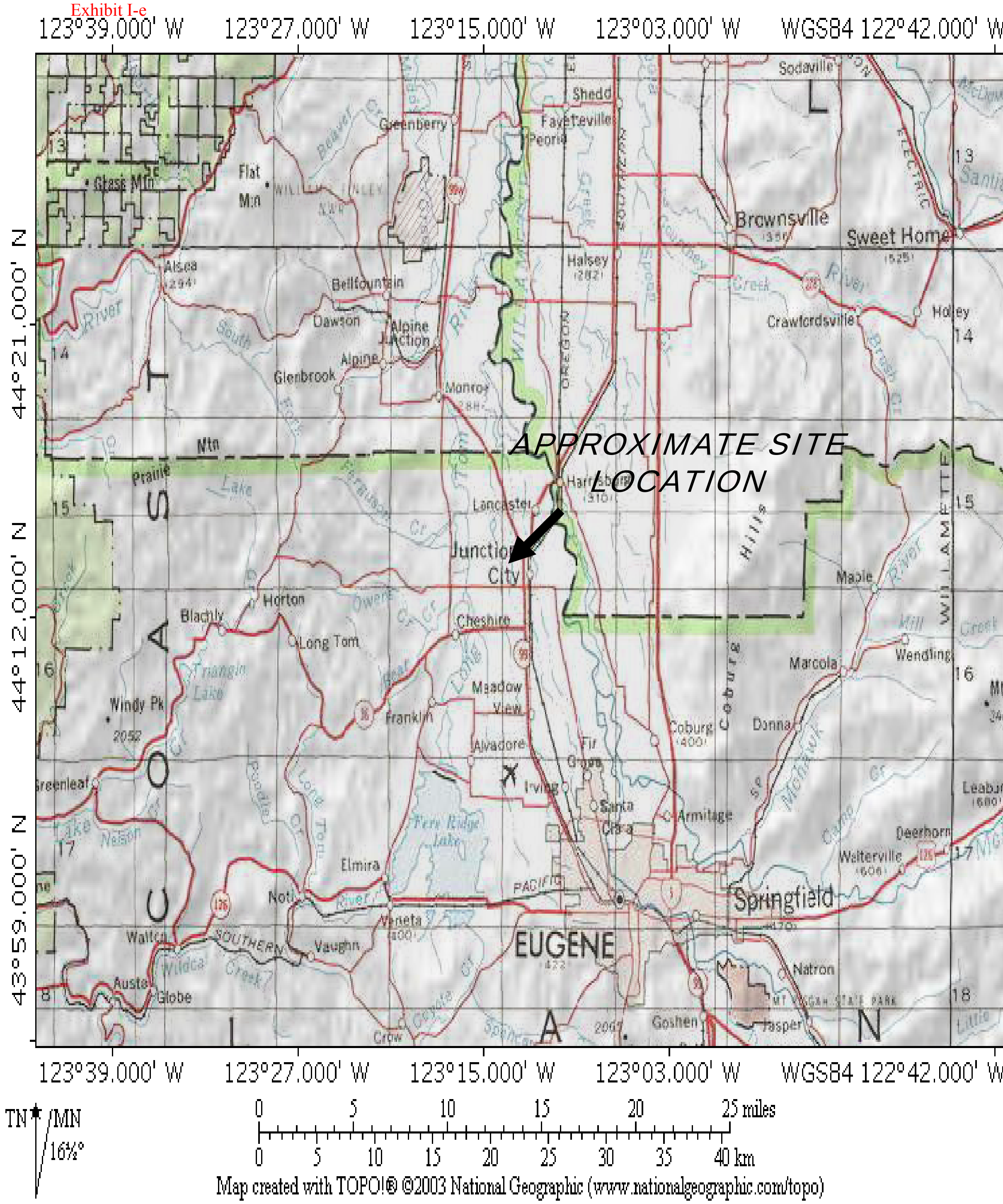
If any subsurface variations become evident during the course of this project, a re-evaluation of the recommendations contained in this report will be necessary after ATC has had an opportunity to observe the characteristics of the conditions encountered. The applicability of this report should also be reviewed in the event that significant changes occur in the design, nature, or location of the proposed construction.

Recommendations provided herein are based in part upon project information provided to ATC and they apply only to the specific project and site discussed in this report. If the project information is incorrect or if additional information is available, the correct or additional information should be conveyed to ATC for review. ATC's recommendations may then be modified, if necessary. Experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team. ATC further recommends that ATC is retained to provide these services based upon our familiarity with the project, the subsurface conditions, and the intent of the recommendations and design criteria.

Environmental issues regarding this site are not addressed in this study. Only geotechnical recommendations for use in design of specific construction elements, earthwork and quality control observation and testing during construction are presented herein.

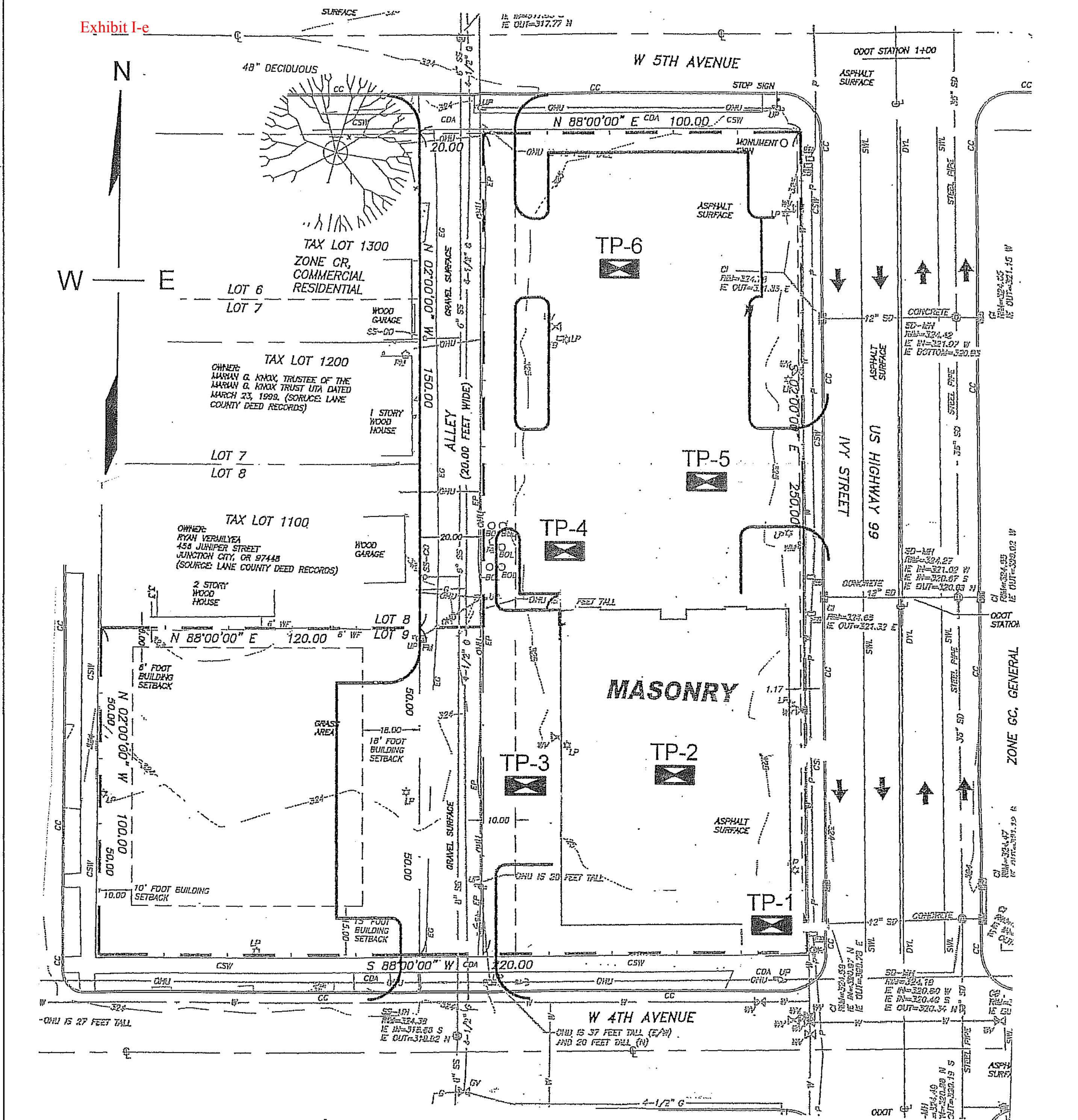
APPENDIX

Exhibit I-e



	489 WEST 5TH STREET TOPOGRAPHIC AND LOCATION MAP JUNCTION CITY, OREGON	**FIGURE 1** **E12019**

Exhibit I-e



TEST PIT LOCATIONS

TP—1

SCALE IN FEET

PROJECT: OReilly Auto Parts Junction City, Oregon	
SHEET TITLE: Site / Test Pit Location	
DESIGNER: CRL	JOB NO. E12019
DRAWN BY: CRL	SCALE: 1" = 40'
CHECKED BY: DMW	FIGURE: 2
DATE: July 16, 2012	FILE: E12019.dwg

TEST PIT LOGS

Depth (feet)	Material Description	Sample No.
	Test Pit TP-1	
	Location: Southeast corner proposed store Approximate ground surface elevation: 325	
0.0 – 0.2	Asphaltic Concrete	
0.2 – 0.5	Crushed Rock Base Course	
0.5 – 3.5	Medium dense, moist, brown, black and gray, Silty Clay with some Gravel and 8 inch Quarry Spalls at depth (Fill).	
3.5 – 8.5	Medium stiff to stiff, moist, dark brown Silty CLAY (CL).	S-1
8.5 – 10.5	Medium dense, moist to very moist, brown GRAVEL with trace silt (GP).	S-2
	Test pit terminated at approximately 10½ feet Slight caving 9 to 10 feet No groundwater encountered	
	Test Pit TP-2	
	Location: Center of proposed store Approximate ground surface elevation: 325	
0.0 – 0.2	Asphaltic Concrete	
0.2 – 0.5	Crushed Rock Base Course	
0.5 – 2.5	Medium dense, moist, brown, black and gray, Silty Clay with some Gravel and 12 inch Quarry Spalls at depth (Fill).	
2.5 – 6.5	Medium stiff to stiff, moist, dark brown Clayey SILT (ML).	S-1
6.5 – 10.0	Medium dense, moist to very moist, brown GRAVEL with trace silt (GP).	S-2
	Test pit terminated at approximately 10 feet No caving No groundwater encountered	

Exhibit I-e

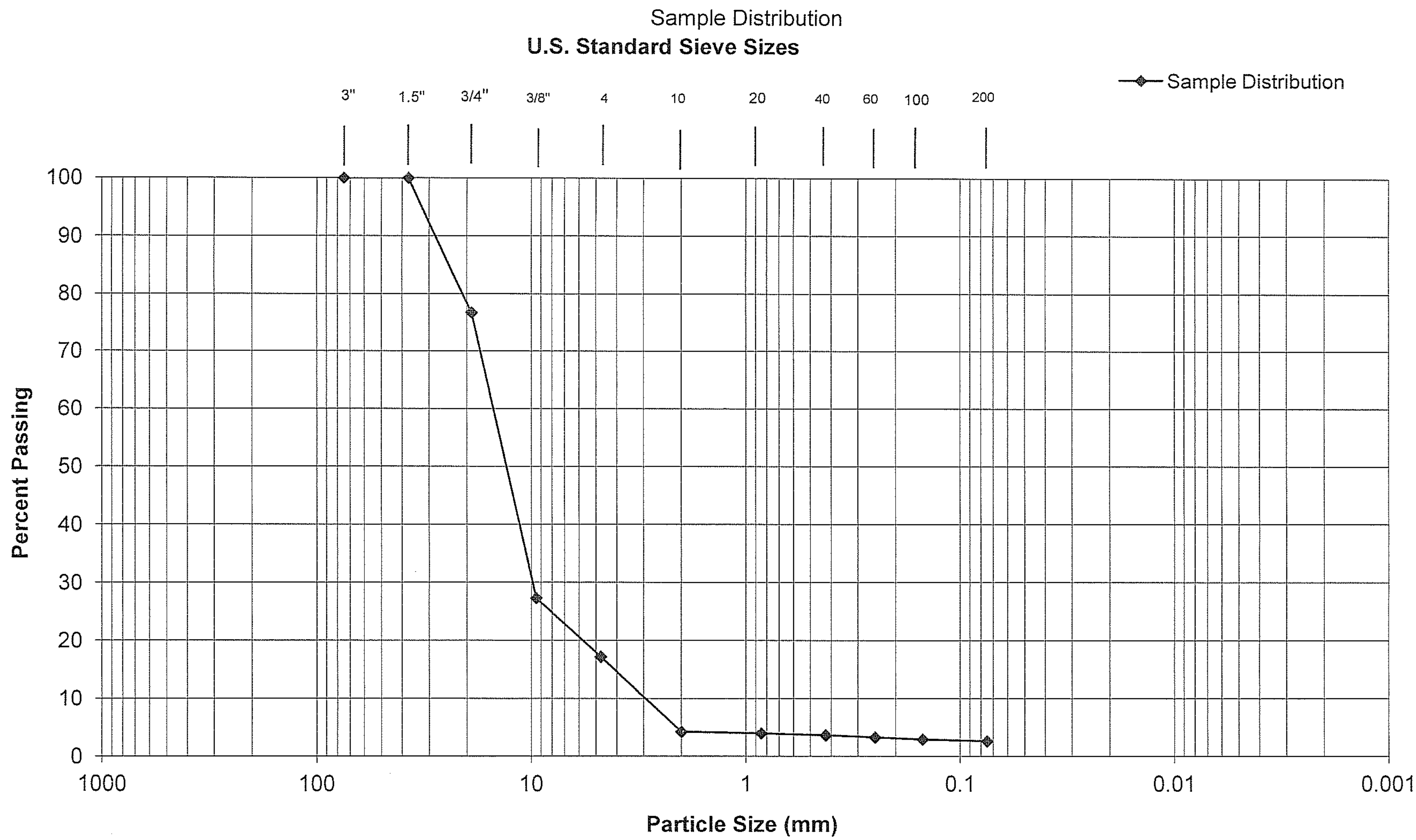
Depth (feet)	Material Description	Sample No.
	Test Pit TP-3	
	Location: West side of proposed store	
	Approximate ground surface elevation: 325	
0.0 – 0.3	Asphaltic Concrete (newer patch)	
0.3 – 0.5	Crushed Rock Base Course	
0.5 – 3.0	Medium dense, moist, brown, black and gray, Silty Clay with some Gravel and 18 inch Quarry Spalls at depth (Fill).	S-1 S-2
3.0 – 8.0	Medium stiff to stiff, moist, dark brown Silty CLAY (CL).	
8.0 – 11.0	Medium dense, moist to very moist, brown GRAVEL with trace silt (GP).	
	Test pit terminated at approximately 11 feet Slight caving at 10 feet No groundwater encountered	
	Test Pit TP-4	
	Location: Northwest corner of proposed store Approximate ground surface elevation: 325	
0.0 – 0.3	Asphaltic Concrete (newer patch)	
0.3 – 0.7	Crushed Rock Base Course	
0.7 – 4.0	Crushed Rock (Fill).	
	Test pit terminated at approximately 4 feet due to obstructing utilities (live water, inactive direct bury electrical cable)	
	Water line was broken and shut off at valve on east side of site No caving observed No groundwater encountered	

Depth (feet)	Material Description	Sample No.
	Test Pit TP-5	
	Location: Southeast side of proposed parking lot (north of store)	
	Approximate ground surface elevation: 325	
0.0 – 0.2	Asphaltic Concrete	
0.3 – 0.6	Crushed Rock Base Course	
0.5 – 7.2	Medium stiff to stiff, moist, dark brown Silty CLAY (CL).	S-1
7.2 – 13.0	Medium stiff, wet, brown SILT (ML).	S-2
	Test pit terminated at approximately 13 feet No caving Groundwater encountered at 12.0 feet, rose to 11.5 in 30 minutes	
	Test Pit TP-6	
	Location: North side of proposed parking lot (north of store)	
	Approximate ground surface elevation: 325	
0.0 – 0.2	Asphaltic Concrete	
0.2 – 0.6	Crushed Rock Base Course	
0.6 – 2.0	Medium dense, moist, brown, black and gray, Silty Clay with some Gravel (Fill).	S-1 S-2
2.0 – 9.0	Medium stiff to stiff, moist, dark brown Silty CLAY (CL).	
9.0 – 13.0	Medium stiff, wet, brown SILT (ML).	
13.0-15.0	Medium dense, moist to very moist, brown GRAVEL with trace silt (GP).	
	Test pit terminated at approximately 15 feet Slight caving at 13 feet Groundwater encountered at 13.0 feet, rose to 11.0 in 30 minutes	

Date Excavated: 7/12/12

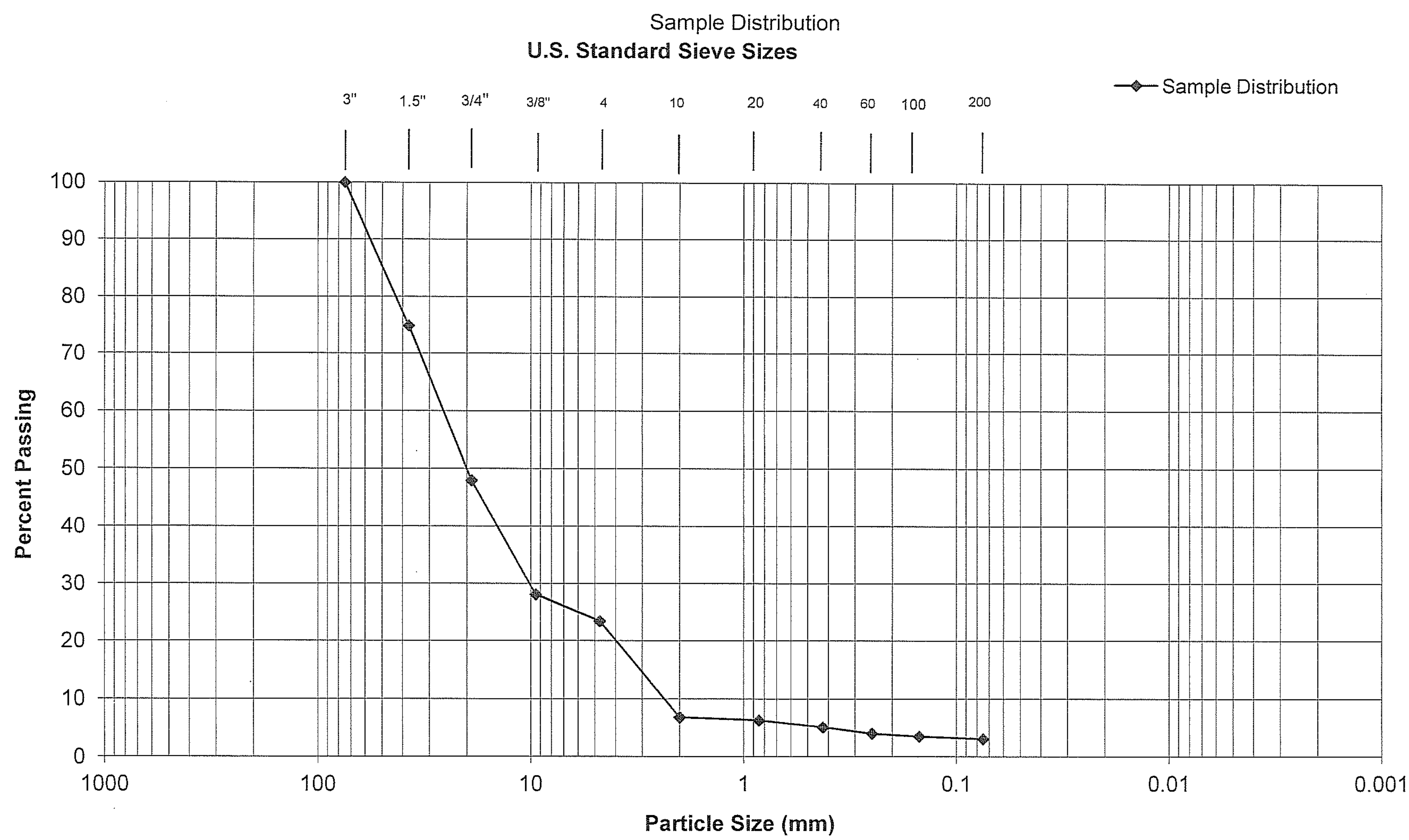
Logged by: DMW

Exhibit I-e

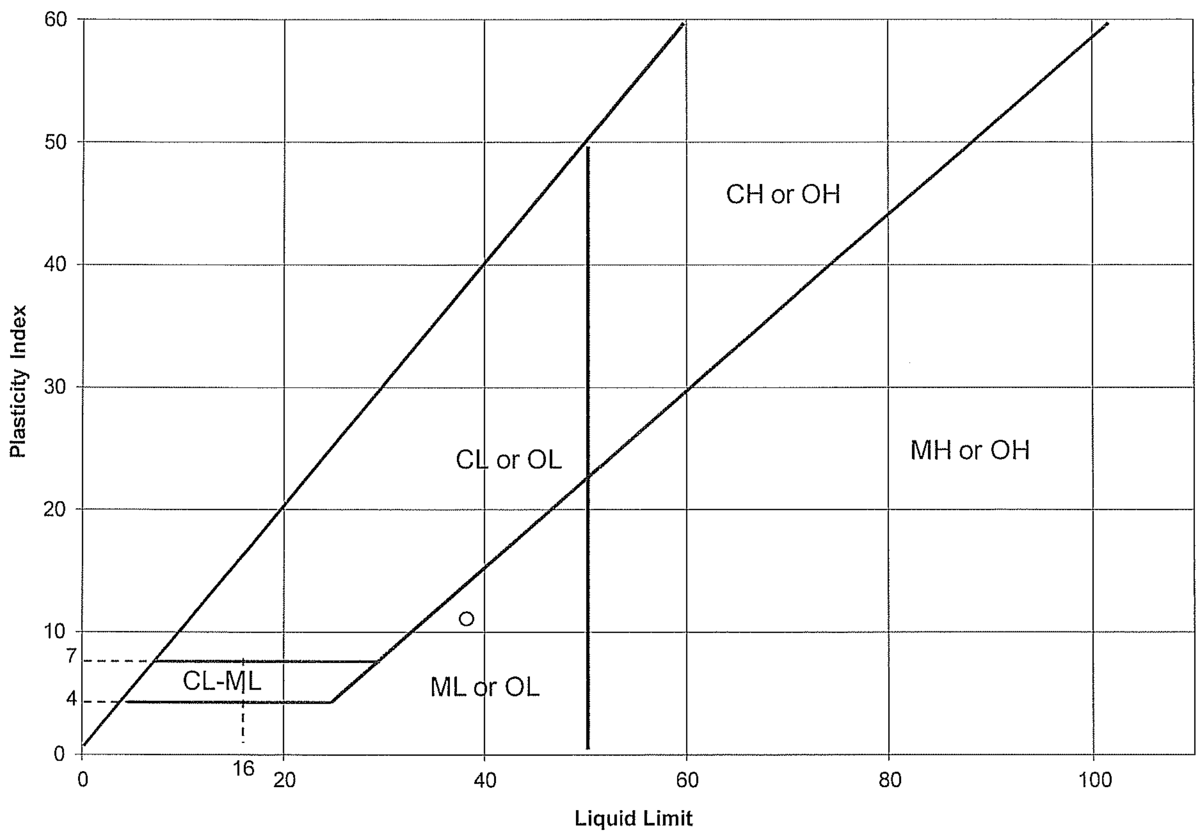


Sample Distribution	Job Name: ATC/Jct City	Sample #: S2
	Job Number: E12019	Date: 07/14/12
Figure:	Tested By: dar	Depth:
	Exploration #: TP-1	

Exhibit I-e



Sample Distribution	Job Name: ATC/Jct City	Sample #: S2
	Job Number: E12019	Date: 07/14/12
Figure: L-2	Tested By: dar	Depth:
	Exploration #: TP-2	

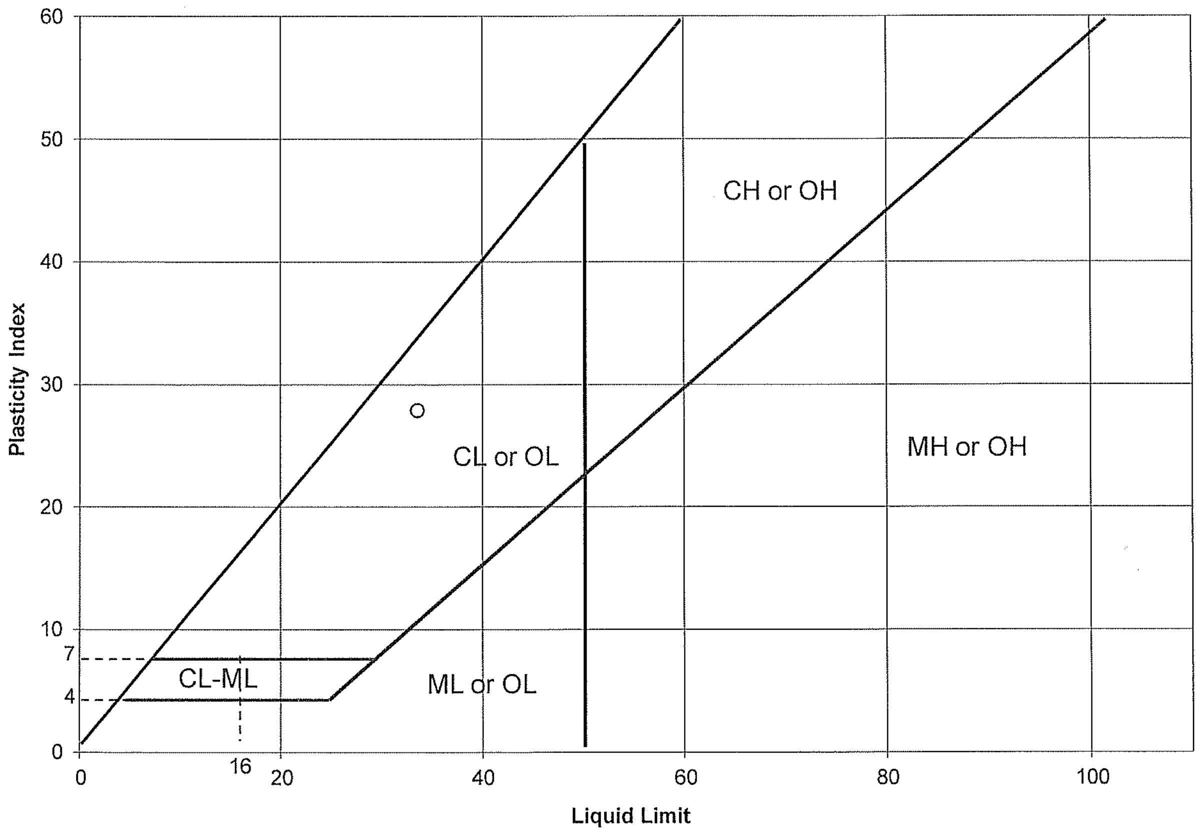


	Job Number:		E12019		
Exploration No.	Sample Depth	Moisture Content	Liquid Limit	Plasticity Index	Soil Description
TP-2	S-1	23.8%	38	11	Silt

Atterberg Limit Test Results

Figure L-3

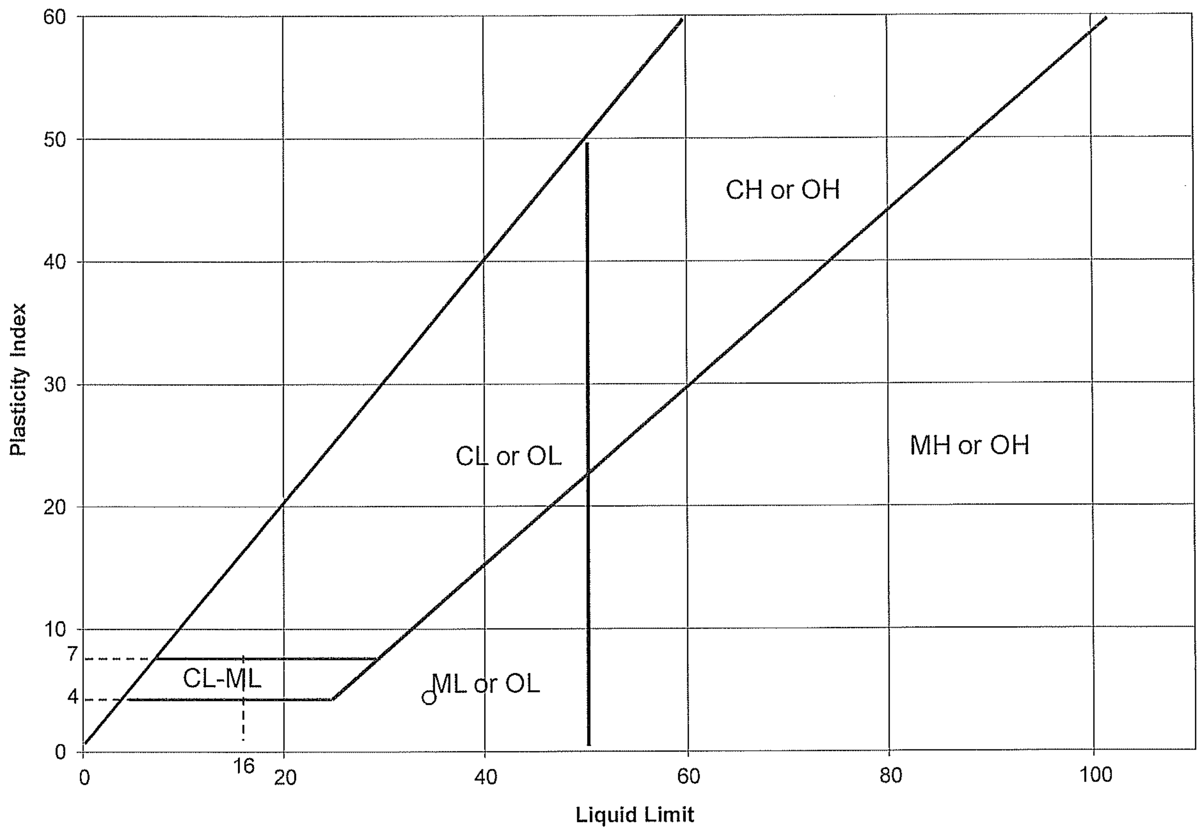
Exhibit I-e



	Job Number:		E12019		
Exploration No.	Sample Depth	Moisture Content	Liquid Limit	Plasticity Index	Soil Description
TP-1	S-1	23.9%	34	28	Clay

Atterberg Limit Test Results

Figure L-4



		Job Number:		E12019	
Exploration No.	Sample Depth	Moisture Content	Liquid Limit	Plasticity Index	Soil Description
TP-6	S-2	42.0%	34	4	Silt

Atterberg Limit Test Results

Figure L-5

Exhibit I-e

KEY TO SYMBOLS AND CLASSIFICATIONS

|	Undisturbed sample recovered
•	Standard Penetration Resistance (ASTM D 1587)
100/2"	Number of blows (100) to drive the spoon a number of inches (2)
AX,BX,NX	Core barrel sizes thet obtain cores 1-1/8, 1-5/8, and 2-1/8 inches in diameter respectively
65%	Percentage of rock core recovered
RQD	Rock quality designation
U	Unit weight test performed
A	Atterberg limits test performed
C	Consolidation test performed
GS	Grain size test performed
T	Triaxial shear test performed
P	Permeability test performed
V	Field shear test performed
	Caved Level
	Water table at least 24-hours after drilling
	Water table one hour or less after drilling

CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

	No. of Blows, N	**Approximate Relative Density**
SANDS	0-4	Very Loose
	5-10	Loose
	11 – 30	Medium Dense
	31 – 50	Dense
	50+	Very Dense
SILTS AND CLAYS	0 – 2	Very Soft
	2 – 4	Soft
	5 – 8	Firm
	9 – 15	Stiff
	16 – 30	Very Stiff
	30+	Hard

Soil sampling and standard penetration testing performed in accordance with ASTM D 1586. The standard penetration resistance is the number of blows of a 140 pound hammer falling 30 inches to drive 2-inch o.d., 1.4-inch i.d., split barrel sampler one foot. Core drilling in accordance with ASTM D 2113. The undisturbed sampling procedure is described by ASTM D 1587. Soil and rock samples will be discarded 30 days after the date of the final report unless otherwise directed.

Exhibit I-e

ATC ASSOCIATES INC.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Exhibit I-e

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
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